The Lalande prize (540 francs), the Valz prize (460 francs), and the G. de Pontécoulant prize (700 francs), for the most interesting observation, memoir, or work in astronomy published during the year.

The Gay prize (1500 francs), for a study of the natural conditions in the Polar regions; the Tchihatchef prize (3000 francs), for exploration in the lesser known portions of Asia.

The Hébert prize (1000 francs), for a treatise or discovery in the practical use of electricity; the Hughes prize (2500 francs), for a discovery contributing to the progress of physics; the Gaston Planté prize (3000 francs), for a French author of a discovery, invention, or important work in electricity; the La Caze prize (10,000 francs), for works or memoirs contributing to the progress of physics; the Kastner-Boursault prize (2000 francs), for the best work on the applications of electricity in the arts, industry, or commerce.

The Jecker prize (10,000 francs), for works useful to the progress of organic chemistry; the Cahours prize (3000 francs), for the encouragement of young chemists; the Montyon prize (2500 francs and 1500 francs), for the discovery of a process rendering a trade or manufacture less unhealthy.

The grand prize of the physical sciences (3000 francs), for a study of underground water from the hygienic point of view; the Delesse prize (1400 francs), for work in geological or mineralogical science.

The Desmazières prize (1600 francs), for the best work during the year on cryptogams; the Montagne prize (1500 francs), to the French author of the best work on the anatomy, physiology, development, or description of the lower cryptogams; the Thore prize (200 francs), for the best work on the cellular cryptogams of Europe; the de Coincy prize (900 francs); the de la Fons-Mélicocq prize (900 francs), for the best botanical work on the north of France.

The Savigny prize (1300 francs), for the assistance of young travelling zoologists specially occupied with the study of the Egyptian and Syrian invertebrates.

A Montyon prize (2500 francs, mentions 1500 francs), for discoveries useful in the art of healing; the Barbier prize (2000 francs), to the author of a valuable discovery in surgical, medical, pharmaceutical, or botanical science; the Bréant prize (100,000 francs), for the discovery of a radical cure for Asiatic cholera or for pointing out the causes of cholera in such a manner that could lead to its total suppression. Failing these, the interest will be awarded annually for the proof of the existence in the air of substances playing a part in the production or propagation of epidemic disease. The Godard prize (1000 francs), for the best memoir on the anatomy, physiology, or pathology of the genito-urinary organs; the Baron Larrey prize (750 francs), for a memoir on military medicine, surgery or hygiene; the Bellion prize (1400 francs), for discoveries profitable to the health of man; the Mège prize (10,000 francs); the Chaussier prize (10,000 francs), for a memoir on legal or practical medicine.

A Montyon prize (750 francs) and the Philipeaux prize (900 francs), for work in experimental physiology; the Lallemand prize (1800 francs), for work on the nervous system; the Pourat prize (1000 francs), for a memoir on the utilisation of pentanes in animal organisms; the La Caze prize (10,000 francs), for a work on physiology.

The Montyon prize (500 francs), for a memoir on French statistics.

The Arago, Lavoisier, and Berthelot medals. The Trémont prize (1100 francs); Gegner prize (3800 francs); the Lannelongue prize (2000 francs); Wilde prize (4000 francs), for memoirs in the subjects of astronomy, physics, chemistry, geology, or experimental mechanics; the Saintour prize (3000 francs); the Petit d'Ormoy prize (two of 10,000 francs), one for pure and applied mathematics, the other for one of the natural sciences; the Leconte prize (50,000 francs); the Pierson-Perrin prize (5000 francs); the prize founded by Mme. la Marquise de Laplace; the Félix Rivot prize (2500 francs).

December 31, 1906, will be the last day for sending in memoirs for the above prizes. The prizes bearing the names of Tchihatchef, La Caze, Delesse, Wilde, and Leconte are awarded without preference of nationality.

VOLCANIC ROCKS FROM NEW ZEALAND.[1]

THE district dealt with in this memoir is part of the principal gold-field of New Zealand. The igneous rocks here, which are the source of the gold, are of Tertiary age, though an older series, of Palæozoic age, occurs in the same district. There had been no previous petrographical study of the rocks, of a kind at once comprehensive and detailed, when a specially made collection of 500 specimens was placed in the hands of Prof. Sollas for description, and the report now before us consequently contains much valuable material. Mr. McKay tells us that the principal object of invoking the aid of this well known petrologist was to place the nomenclature of the rocks on a more satisfactory footing. Whatever the object, we are glad to welcome the result, and we also accept gratefully the lavish illustration which attests the liberality of the New Zealand Government. There are upward of 100 plates, reproduced by "process" from photographs, most of them representing thin slices of rocks photographed from the microscope. A figure measuring 7 inches by 5 inches affords a much better conception of the micro-structure of a rock than can be gained from the illustrations in most petrographical memoirs.

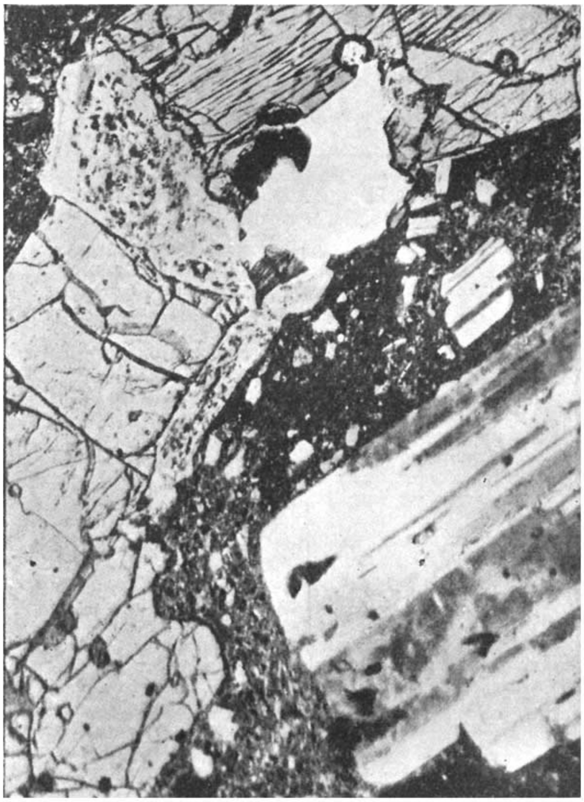

FIG. 1.—Hyalopilitic Hypersthene-Andesite; thin slice photographed in polarised light, magnification about 20 diameters.

The introductory section by Mr. McKay gives a historical account of the district, with bibliographical references, and also sets forth the bearings of Prof. Sollas's results upon the general geology of the district. The Tertiary volcanic rocks are all andesites, dacites, and rhyolites. We may note here a striking contrast with the southern part of New Zealand, where, in the neighbourhood of Dunedin, is found a great variety of phonolites, tinguaites, trachytes, and other types rich in alkalies. The sequence in the Cape Colville district is also of interest. The

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[1] "The Rocks of Cape Colville Peninsula, Auckland, New Zealand." By Prof. Sollas, F.R.S. With an Introduction and Descriptive Notes by Alexander McKay, Government Geologist, N.Z. Vol. i. Pp. viii+289; with many plates. (Wellington, 1905.)

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Eocene volcanic rocks were mostly andesitic flows and breccias; the Miocene wholly andesitic or dacitic, stratified tuffs with coal; the Pliocene a succession of rhyolitic flows and breccias.

The description by one geologist of specimens collected by another at the Antipodes is a division of labour which has drawbacks as well as advantages. Prof. Sollas, however, has faced the difficulty successfully, and the large amount of labour which he has expended on this study has produced results which have a value by no means confined to New Zealand geology. Arising from the detailed examination of the rocks, there are a number of more general questions of petrographical interest on which the author is able to throw light. One point is the recognition in the ground-mass of the so-called "pilotaxitic" andesites of an interstitial mosaic of quartz, which plays the same part as the glassy base in the "hyalopilitic" type. Another point is the discovery of a certain isotropic hydrated decomposition-product, which partly or wholly replaces the felspar crystals in some of the rhyolites. This was taken by Rutley for glass, and regarded as evidence of the re-fusion of the rock. Our author finds no evidence of devitrification in the glassy rhyolites of this district, but there may be considerable chemical alteration. The Palæozoic dyke-rocks are also described and discussed. They range from quartz-diorite, through "dacite-porphyrite," to dacite, the second being given as a new name to a type of intermediate characters which agrees generally with propylite as defined by Zirkel. We may remark that the term "dacite-porphyry" has been used by American petrologists for a rock not essentially different (see, *e.g.*, Iddings in *Bull.* 150 *U.S. Geol. Sur.* [1898], p. 233).

The report under notice is marked "vol. i.," and we may expect that the geological and petrological study of the Cape Colville district will yield further results of interest. One question which remains to be elucidated is that of the mode of occurrence and origin of the gold. Comparison with the well known Comstock district of Nevada suggests that careful chemical assays of the rocks, both fresh and decomposed, would give significant information on this point.

A. H.

INSECTS AS CARRIERS OF DISEASE.[1]

"Infinite torment of flies."—*Tennyson.*

THE last few years are marked in the annals of medicine by a great increase in our knowledge of certain parasitic diseases, and, above all, in our knowledge of the agency by which the parasites causing the diseases are conveyed.

Chief among these agencies, in carrying the disease-causing organisms from infected to uninfected animals, are the insects, and, amongst the insects, above all the flies. Flies, *e.g.* the common house-fly (*Musca domestica*), can carry about with them the bacillus of anthrax. Flies, ants, and other even more objectionable insects, are not only capable of disseminating the plague-bacillus from man to man, and possibly from rat to man, but they themselves fall victims to the disease, and perish in great numbers. They are active agents in the spread of cholera, and the history of the late war in this country definitely shows that flies play a large part in carrying the bacilli of enteric fever from sources of infection to the food of man, thus spreading the disease.

The diseases already mentioned are caused by bacteria. But flies also play a part in the conveyance of a large number of organisms which are not bacteria, but which, nevertheless, cause disease.

In considering the part played by flies in disseminating diseases not caused by bacteria, we can neglect all but a very few families, those flies which suck blood having alone any interest in this connection.

From the point of view of the physician, by far the most important of these families is the Culicidæ, with more than 300 described species and 5 subfamilies, of which two, the Culicina and the Anophelina, interest us in relation to disease. The gnats or mosquitoes are amongst the most graceful and most beautiful insects that we know; but they have been judged by their works and undoubtedly are unpopular, and we shall see that this unpopularity is well deserved. Gnats belong both to the genus Culex and to the genus Anopheles. The genus Culex, from which the order takes its name, includes not only our commonest gnat, often seen in swarms on summer evenings, but some hundred and thirty other species. Members of this genus convey from man to man the *Filaria nocturna*, one of the causes of the widely-spread disease filariasis. In patients suffering from this disease, minute embryonic round-worms swarm in the blood-vessels of the skin during the hours of darkness. Between six and seven in the evening they begin to appear in the superficial blood-vessels, and they increase in number until midnight, when they may occur in such numbers that five or six hundred may be counted in a single drop of blood. After midnight, the swarms begin to lessen, and, by breakfast time, about eight or nine in the morning, except for a few strayed revellers, they have disappeared from the superficial circulations, and are hidden away in the larger blood-vessels and in the lungs.

In spite of their incredible number, some authorities place it at thirty to forty millions in one man, these minute larval organisms, shaped something like a needle pointed at each end, seem to cause little harm. It might be thought that they would traverse the walls of the blood-vessels, and cause trouble in the surrounding tissues; but this is prevented by a curious device. It is well known that, like insects, round-worms from time to time cast their skins, and the young larvæ in the blood cast theirs, but do not escape from the inside of this winding-sheet; and thus, though they actively wriggle and coil and uncoil their bodies, their progress is as small, and their struggles as little effective, as are those of a man in a strait-waistcoat.

One reason of the normal appearance of the creatures in the blood at night is undoubtedly connected with the habits of its second host, the gnat or mosquito. Two species are accused of carrying the Filaria from man to man—*Culex fatigans* and *Anopheles nigerrimus.* Sucked up with the blood, the round-worms pass into the stomach of the insect. Here they appear to become violently excited, and rush from one end to the other of their enveloping sheath, until they succeed in breaking through it. When free, they pierce the walls of the stomach of the mosquito, and come to rest in the great thoracic muscles. Here the Filarias rest for some two or three weeks, growing considerably and developing a mouth and an alimentary canal, thence, when they are sufficiently developed, they make their way to the proboscis of the mosquito. Here they lie in couples. Exactly how they effect their exit from the mosquito and their entrance into man has not yet been accurately observed; but presumably it is during the process of biting. Once inside man, they work their way to the lymphatics, and very soon the female begins to pour into the lymph a stream of young embryos, which reach the blood-vessels through the thoracic duct. It is, however, the adults which are the source of all the trouble. They are of considerable size, three or four inches in length; and their presence, by blocking the channels of the lymphatics, gives rise to a wide range of disease, of which elephantiasis is the most pronounced form.

We now pass to the second of the diseases carried by gnats, that of Malaria.

The parasite which causes malaria is a much more lowly organised animal than the Filaria. It is named Hæmamœba, and it too is conveyed by an insect, and, so far as we know, by one genus of mosquito only, the Anopheles. Hence from the point of view of malaria it is important to know whether a district is infected with Culex or Anopheles. The former is rather humpbacked and keeps its body parallel with the surface it is biting, and its larva hangs at an angle below the surface of the water by means of a respiratory tube. Anopheles, on the other hand, carries its body at a sharp angle with the surface upon which it rests, and its larva lies flat below the surface-film and parallel with it. The malarial parasite lives in the blood-cells of man, but at a certain period it breaks up into spores which escape into the fluid of the blood, and it is at this moment that the sufferer feels the access of fever. Their presence and growth within the blood-cells

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[1] From an Address delivered before the British Association at Pretoria, by A. E. Shipley, F.R.S.

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